TRI-STATE

April 27, 2021

Mr. Zach Trujillo
Environmental Protection Specialist
Colorado Division of Reclamation, Mining & Safety
Department of Natural Resources
1313 Sherman Street, Room 215
Denver, CO 80203

RE: Colowyo Coal Company L.P.
Permit No. C-1981-019
Technical Revision No. 147 (TR-147)
Collom and South Taylor Highwall Mining

Dear Mr. Trujillo,

Tri-State Generation and Transmission Association Inc. (Tri-State), is the parent company to Axial Basin Coal Company, which is the general partner to Colowyo Coal Company L.P. (Colowyo). Therefore, Tri-State on behalf of Colowyo is submitting technical revision 147 (TR-147) to Permit No. C-1981-019.

TR-147 proposes additional highwall mining areas in the Collom and South Taylor Pits. In the South Taylor Pit, Colowyo's proposed highwall mining plan will target the G7 seam in the west and southwest portion of the pit. In the Collom Pit, Colowyo's proposed highwall mining plan will target the B1/B2, C3/C5, D1/D2, and E2 seams.

Included in this technical revision is a change of index sheet to ease incorporation of this revision into the permit document, and a public notice for your review. If you should have any additional questions or concerns, please feel free to contact Tony Tennyson at (970) 824-1232 at your convenience.

Sincerely,

DocuSigned by:
Daniel Casiraro
B70D69F114324DE...

Daniel J. Casiraro
Senior Manager
Environmental Services

DJC:TT:der

Enclosure

cc: Jennifer Maiolo (BLM-LSFO)
Chris Gilbreath (via email)
Tony Tennyson (via email)
Angela Aalbers (via email)
File: C. F. 1.1.1.207 - G471-11.3(21)d

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CHANGE SHEET FOR PERMIT REVISIONS, TECHNICAL REVISION, AND MINOR REVISIONS

Mine Company Name: **Colowyo Coal Company L.P.**

Permit Number: **C-1981-019**

Date: **April 26, 2021**

Revision Description: **TR-147 Collom & South Taylor Highwall Mining**

Volume Number	Page, Map or other Permit Entry to be REMOVED		Page, Map or other Permit Entry to be ADDED		Description of Change
1	Rule 2 Page 2.06-6 (1 page)		Rule 2 Page 2.06-6 (1 page)		Section 2.06.9 has been updated.
2A					No Change
2B					No Change
2C					No Change
2D					No Change
2E					No Change
3					No Change
4					No Change
4					No Change
5A					No Change
5B					No Change
6					No Change
7	Map 19		Map 19		Map 19 has been updated.
8	Map 23		Map 23		Map 23 has been updated.
9					No Change
10					No Change
12	South Taylor/Lower Wilson - Rule 2, Page 89 (1 page)		South Taylor/Lower Wilson - Rule 2, Page 89 (1 page)		Section 2.06.9 has been updated.
12	South Taylor/Lower Wilson - Rule 4, Page 13 (1 page)		South Taylor/Lower Wilson - Rule 4, Page 13 (1 page)		Map citation in Section 4.23.2 has been updated.
13	Exhibit 23, Item 1, Addendum 1 cover page (1 page)		Exhibit 23, Item 1, Addendum 1 cover page (1 page)		Note has been added to cover page to add a citation.
14					No Change
15	Table of Contents page ii (1 page)		Table of Contents page ii (1 page)		Volume 15 Table of Contents has been updated.
15	Table of Contents page x (1 page)		Table of Contents page x (1 page)		Volume 20 List of Exhibits has been updated.

CHANGE SHEET FOR PERMIT REVISIONS, TECHNICAL REVISION, AND MINOR REVISIONS

Mine Company Name: **Colowyo Coal Company L.P.**

Permit Number: **C-1981-019**

Date: **April 26, 2021**

Revision Description: **TR-147 Collom & South Taylor Highwall Mining**

Volume Number	Page, Map or other Permit Entry to be REMOVED		Page, Map or other Permit Entry to be ADDED		Description of Change
15	Collom - Rule 2, Pages 108 ad 109 (2 pages)		Collom - Rule 2, Pages 108 ad 109 (2 pages)		Section 2.06.9 - 2.06.11 has been updated.
16					No Change
17					No Change
18A					No Change
18B					No Change
18C					No Change
18D					No Change
19					No Change
20	Volume 20 List of Exhibits (1 page)		Volume 20 List of Exhibits (2 pages)		Volume 20 List of Exhibits has been updated.
20			Exhibit 27, Item 7 Cover Page and Addendum (20 pages)		Exhibit 27, Item 7 has been inserted into the permit.
21					No Change
22	Map 19C		Map 19C		Map 19C has been updated.

the last highwall mining panel in 2006 and the East Pit is currently in final reclamation per the approved reclamation plan. Highwall mining occurred in the B, C, D, and E coal seams. Mining activities commenced on the bottom E seam, and then progress sequentially upward through the remaining seams. As the seams were mined out, the pit was backfilled up to the floor of the next higher seam, with spoil placed by a dragline or from the truck shovel operation. The backfilling of the pit was required to attain conformance with Colowyo's permitted reclamation plan/post-mining topography, and the partially backfilled pit also served as a temporary level pit floor to work from to mine the next higher seam.

Historically, in the West Pit, highwall mining successfully occurred in the X seam that underlied the West Pit Parking Lot Area and the E seam on the southwestern end of the pit underlying part of the Section 16 Pit. Colowyo also highwall mined the F, E, D2, and C seams in the final highwall of the West Pit (see Map 23 for historical mining locations). After the F seam was mined out the pit was backfilled up to the E seam and highwall mining commenced again. This same sequence occurred from the E, D2, and C seam. This sequence of backfilling and highwall mining ensured the final pit was be backfilled in a contemporaneous manner in accordance with the approval spoil grading plan.

For highwall mining description in the South Taylor Pit, please see Volume 12, Section 2.06.9, and for the Collom Pit please refer to Volume 15, Sections 2.06.9-2.06.11.

Operation Conducted in Compliance with 4.23

While performing highwall mining, Colowyo will meet all applicable requirements of the Rules, and the operation will be conducted in compliance with 4.23.

2.06.10 Coal Processing Plans and Support Facilities Not Located Within the Permit Area

This Subsection does not apply to the coal mining operations planned by Colowyo.

2.06.11 In-Situ Processing Activity

This Subsection is not applicable to the mining operations planned by Colowyo.

2.06.9 Augering and Highwall Mining

In the South Taylor Pit, highwall mining has successfully occurred on the E, D2, G7/G8 seams in the northwestern area of the West Taylor Fill, the low and end walls, and the northeastern extent of the South Taylor box cut. Please see Map 23 for these locations. Currently, Colowyo will be highwall mining the G7 seam on the end wall and highwall on the southwest and west side of the South Taylor Pit (see Map 23). Once the G7 seam is exposed to the full extent, highwall mining will occur along the length of the seam exposed in the pit. Please refer to Volume 13 Exhibit 23, Item 1 and Addendum 1, and Volume 20, Exhibit 27, Item 7 for geotechnical considerations for highwall mining in the South Taylor Pit.

Please see Volume 1, Rule 2.06-8 for previously highwall mining locations in the East and West Pits.

2.06.10-2.06.11 Processing Plants, In-Situ Processing

See original permit for these three sections

2.06.12.1 Coal Refuse Piles

Coal refuse piles do not exist on the Colowyo property. Thus, this section is not applicable.

2.07 – 2.10 VARIOUS

Information required by these sections is included in Volume 1, in other sections of this application, in the cover letter or is not applicable to the South Taylor mining area. Colowyo understands the permitting process employed by the Division and will facilitate that process as requested.

To date these efforts have proven successful. Large herds of deer and elk are regularly seen grazing on the reclaimed areas. Rodent and small game populations have reestablished on the reclaimed areas providing a readily available food source for local raptor populations and other predators.

4.19 PROTECTION OF UNDERGROUND MINING

Colowyo will conduct no coal mining closer than 500 feet to any point of either an active or abandoned underground mine. Underground coal mines have been operated in the past as discussed in Section 2.04.4, but their locations were on the-northern side of Streeter Draw well over 500 feet from present Colowyo mining.

The surface mining activities of Colowyo have been designed so as not to endanger any present or future operations of either surface or underground mining operations. As discussed in Section 2.05.3, Colowyo has engineered its mining plan to maximize recovery of coal by current economical surface mining methods.

4.20 SUBSIDENCE CONTROL

Colowyo is conducting a surface coal mining operation. Therefore, the requirements of 4.20 are not applicable to the Colowyo operation.

4.21 COAL EXPLORATION

All coal exploration activities within the South Taylor/Lower Wilson permit revision area will be completed in accordance with the requirements and procedures outlined in Volume 1.

4.22 CONCURRENT SURFACE AND UNDERGROUND MINING

Colowyo does not currently plan to have concurrent surface or underground mining activities; therefore, the requirements of this Section are not applicable to this permit application.

4.23 AUGER AND HIGHWALL MINING

4.23.1 Scope

This Section establishes environmental protection performance standards in addition to those applicable performance standards in Rule 4, to prevent any unnecessary loss of coal reserves and to prevent adverse environmental effects from auger mining incident to surface mining activities.

4.23.2 Maximize Recoverability of Mineral Reserves

Colowyo has identified areas suitable for highwall mining at South Taylor (Map 23). Highwall mining allows for the recovery of additional coal resources beyond the final pit highwalls and end-walls. These coal reserves are economically recoverable using highwall mining methods.

From a strip mining perspective, the South Taylor Pit clearly delineates the maximum recoverable coal resources attainable today with modern surface technology and coal market demand and pricing. The highwall mining of the G-seams on the west side of the pit represents recovery of reserves that would not have been recovered by any other means utilizing either surface or underground mining techniques.
Section 4.23 of Volume 1 contains additional discussion regarding the removal of coal using highwall mining methods. The document includes a summary of the geologic factors that limit removal of the coal using conventional methods, the requirements for leaving undisturbed areas of coal in un-mined sections,

EXHIBIT 23, ITEM 1, ADDENDUM 1

ADDENDUM TO
GEOTECHNICAL STABILITY REPORT
FOR HIGHWALL MINING AT THE
COLOWYO COAL MINE

PLEASE REFER TO VOLUME 20 EXHIBIT 27, ITEM 7 FOR HIGHWALL MINING GEOTECHNICAL CONSIDERATIONS FOR HIGHWALL MINING ON THE SOUTHWEST AND WEST SIDE OF THE SOUTH TAYLOR PIT

TABLE OF CONTENTS

LIST OF EXHIBITS

Irrigation diversion points, irrigation ditches, and topography are shown on Map 10B. These areas are well outside the subject drainages of Collom Gulch, Little Collom Gulch, and Jubb Creek.

Thus, the same conclusions as those previously presented for the creeks in the Collom syncline area may be reached for the area of disturbance for construction of the Collom Haul Road in the vicinity of the Gossard Loadout facility (Map 25E Sheet 1 of 4):

- Alluvial materials are present in the valley bottom of the Gossard Loadout complex, and the lower reaches of the Lower Wilson Creek drainage, but the materials are intermixed with significant fractions of colluvium and sheetwash from adjacent slopes and the mass wasting event experienced in 1983-1984.
- Based on an average depth to groundwater of at least 20 feet , coupled with data from monitoring wells and geotechnical test holes in the Wilson Creek area drilled in 2015,subirrigation within this valley bottom is very limited in extent (outside and north of the permit area) or non-existent. Active erosion in the stream channels is causing further incision and reduced flood frequency, reducing the ability of this valley bottom to support any agricultural use other than rangeland or dryland agriculture. There is no evidence of "modern terracing" in the area that will be disturbed near the Gossard Loadout facilities.
- Local and regional agricultural economics are prohibitive to developing irrigation projects within this valley bottoms, and such practices are in decline locally.
- Historical irrigation activities associated with the "diversion structure and ditch" located on Wilson Creek; divert water around the existing grain fields, under County Road 17, outside the current permit boundary to the fields northeast of County Road 17. This activity is still performed when water is available to the diversion structure as the mass wasting events (1983-1984) limited the function of this system.

Colowyo contends that based on the descriptions and defining characteristics needed to classify an area as a functioning alluvial valley floor, the area to be disturbed that is associated with the Collom Haul Road within the Lower Wilson Drainage does not qualify as an alluvial valley floor. Thus, no material damage assessment, water monitoring program, etc., is required due to the fact the area is not a functional alluvial valley floor. Colowyo does plan to return the area of disturbance to pre-disturbance condition at the cessation of mining activities.

2.06.9 – 2.06.11 Augering, Processing Plants, In-Situ Processing

In the Collom Pit, highwall mining will target the X3/X4, B1/B2/B3, C3/C5, D1/D2, E2, F5/F6, F_A/F_B, G7/G8/G9 and G_B seams. Please see Map 23B for the overall extent of the highwall mining plan for the Collom Pit. All seams will be developed in a top-down sequence following the Collom Pit down as it is driven. The planned highwall mining sequencing will begin with the X3/X4 seam, and once mining is completed the highwall mining will continue down to the next available seam in the sequence following right behind pre-strip surface mining operations. For additional detail on the highwall mining technique that will be utilized please see Volume 1, Section 2.06.9. For geotechnical considerations for highwall mining in the Collom Pit please refer to Volume 20 Exhibit 27, Items 6 and 7.

Please see Volume 1 for Sections 2.06.10 and 2.06.11.

2.06.12.1 Coal Refuse Piles

Coal refuse piles do not exist on the Colowyo property. Thus, this section is not applicable.

2.07 – 2.10 VARIOUS

Information required by these sections is included in Volume 1.

LIST OF EXHIBITS – VOLUME 20

Exhibit 10, Item 6	Proposed Collom Coal Mine Project Baseline Vegetation Survey, May 2006, Cedar Creek Associates, Inc.
Exhibit 10, Item 7	Wetlands and Waters of the US Delineation for Collom Project, May 2006, Cedar Creek Associates, Inc.
Exhibit 11, Item 1	Wildlife Survey Report for the Collom Permit Study Area, August 25, 2006, Cedar Creek Associates, Inc.
Exhibit 11, Item 2	2007 Wildlife Monitoring Report for the Collom Permit Study Area, December 20, 2007, Cedar Creek Associates, Inc.
Exhibit 13C	Cumulative Bond Collom Haul Road and Facilities
Exhibit 14, Item 7	Pre-Blast Survey – Structures within ½ Mile of Collom Mining Area (Pending)
Exhibit 14, Item 8	Pre-Blast Survey – Offering Letters Pre-Blast Structure Locations Drawing
Exhibit 23, Item 1	Geotechnical Report for the Temporary Spoil Pile
Exhibit 23, Item 2	Addendum to Geotechnical Analysis
Exhibit 24, Item 1	Collom Haul Road Culverts
Exhibit 25 Item 1	Groundwater Monitoring Well Information
Exhibit 26, Item 1	Alluvial Groundwater Monitoring Well Information
Exhibit 27, Item 1	Collom Haul Road Geotechnical Drilling
Exhibit 27, Item 2	Wilson Reservoir Geotechnical Drilling
Exhibit 27, Item 3	Collom In Pit Drilling
Exhibit 27, Item 4	Collom Topsoil Depth Testing
Exhibit 27, Item 5	Collom Facilities Geotechnical Drilling
Exhibit 27, Item 6	Collom Highwall Mining Geotechnical Design and Operational Considerations

Exhibit 27, Item 7 Addendum Collom and South Taylor Highwall Mining
Geotechnical Design and Operational Considerations

Exhibit 27, Item 7

Addendum Collom and South Taylor Highwall Mining Geotechnical Design and Operational Considerations

April 23, 2021 227-43

Mr. Lee Sampson, P.E.
Senior Mining Engineer
Colowyo Coal Company
5731 Highway 13
Meeker, CO 81641-9124

Re: **Additional Highwall Mining Areas, Collom Box Cut and South Taylor Pit, Colowyo Coal Mine, Meeker, Colorado**

Dear Lee:

As you requested on behalf of Colowyo Coal Company (Colowyo), Agapito Associates, Inc. (AAI) has reviewed additional target areas for potential highwall mining (HWM) near the Collom box cut (Collom) and from the South Taylor Pit (South Taylor). AAI previously studied HWM areas for Collom and South Taylor and developed detailed reports for each.[1,2] The additional targets relative to the previously studied areas are shown in Figure 1.

AAI's previous South Taylor study[1] included mining of the G7 Seam, and where the G7 and G8 Seams come together, their combined thickness (referred to as the G78 Seam). This mining was planned from the low wall (southeast portion) and endwalls (southwest and northeast portions) of the pit. Colowyo is currently considering an additional area not specifically addressed in our previous report, in the northwest and southwest portions of the pit, where only the G7 Seam will be targeted. The original study area and the expanded area for South Taylor are shown in Figure 1.

AAI's previous Collom study[2] included mining of several seams from the low wall and endwalls of the Collom Box Cut. Most of the targets are seam splits that occur close to one another, with little or no parting thickness. For example, the B2/B3 Seam consists of the combined B2 and B3 splits. Mining from the low wall generally included HWM panels mined downdip to the north. This previously studied HWM area in Collom is also shown in Figure 1. Colowyo is currently considering two additional areas not specifically addressed in our previous report. The area in Figure 1 labeled "North Target Area" may be mined updip to the south, and targets the B1/B2, C3/C5, D1/D2, and E2 Seams. The area labeled "South Target Area" may be mined generally along strike from either side of the drainage and targets the D1/D2 and E2 Seams.

[1] Agapito Associates, Inc. (2014), "Geotechnical Design and Operational Considerations for Highwall Mining, South Taylor Pit G78 and E/D2 Seams, and West Pit F, E, D2, and C Seams," report to Colowyo Coal Company, April 21, 78 pp.

[2] Agapito Associates, Inc (2019a), "Geotechnical Design and Operational Considerations for Highwall Mining, Collom Box Cut," report to Colowyo Coal Company, November 20, 143 pp.

AAI reviewed the relevant South Taylor[1] and Collom[2] HWM reports and the updated seam models supplied by Colowyo for the target seams in the additional areas shown on Figure 1. The original studies included compilation of site-specific rock physical properties for both pits, comparison with previous data for other HWM areas of the Colowyo Mine, and detailed analytic and numerical modeling analyses. AAI also reviewed documents related to the filing of the Ground Control addenda for the South Taylor G78 Seam[3] and the Collom B1/B2, C3/C5, D1/D2, and E2 Seams[4] with the Mine Safety and Health Administration (MSHA). The Ground Control addenda referenced different versions of AAI's work for South Taylor[5] and Collom,[6] but the approved design criteria meet or exceed AAI's recommendations.[1,2]

In all, AAI has completed more than 10 HWM studies for Colowyo. Based on our experience on the property over the last 18 years, it is our opinion that the approved design criteria are applicable to the target seams in the additional areas indicated on Figure 1. The geometric details of the seams in the new areas are slightly different than those discussed in our previous reports.[1,2,6] A summary of seam characteristics in the additional target areas is given in Table 1. Small differences in seam height and/or design cover depth required that the approved web and barrier pillar design curves for the target seams be expanded to include a wider range of these inputs. The updated design curves are shown in Figures 2 through 6. AAI recommends the use of these curves in conjunction with other recommendations from our reports[1,2] to accomplish the mining envisioned for the additional areas of Figure 1.

Table 1. Geometric Characteristics of the Target Seams in Additional Areas

Pit	Parameter	Value (ft)
South Taylor	G7 Cover	30–355
	G7 Thickness	6–9.5
Collom	B2/B3 Cover	90–205
	B2/B3 Thickness	5–8
	B3 to C3 Interburden	20–55
	C3/C5 Cover	170–265
	C3/C5 Thickness	8–10
	C5 to D1 Interburden	30–105
	D1/D2 Cover	30–305
	D1/D2 Thickness	7.5–12.5
	D2 to E2 Interburden	17 –55
	E2 Cover	50–355
	E2 Thickness	4.5–7.5

[3] Phillipson, S. E. (2013), "Evaluation of Pillar Stability in the South Taylor Pit, G78 Seams, at Colowyo Coal Co, LP's Colowyo Mine, I.D. 05-02962," MSHA memorandum 13BA142a, September 30, 2 pp.

[4] Lemons, M. L. (2020), "Colowyo Mine ID No. 05-02962 Ground Control Plan Highwall Mining Addendum for: Collom Pit X3/X4, B2/B3, C3/C5, D1/D2, E2, F5/F6, FA/FB, G8/G9 and GB Coal Seams," letter to Colowyo Coal Company, LP, May 14, 44 pp.

[5] Agapito Associates, Inc. (2013), "Highwall Mining Design Curves Based on the ARMPS-HWM Program," letter to Dr. Sandin Phillipson, MSHA Approval and Certification Center, September 27, 16 pp.

[6] Agapito Associates, Inc (2019b), "Geotechnical Design and Operational Considerations for Highwall Mining, Collom Box Cut," report to Colowyo Coal Company, August 5, 143 pp.

Previously, AAI suggested leaving a safety pillar below structures that Colowyo would like to protect from subsidence damage should HWM pillar failure occur. In particular, a transmission line passes through the expanded South Taylor target area. The extent of the safety pillar below a protected structure, where no HWM would occur, can be determined following a method suggested by Peng.[7] This method includes a fixed 30-foot (ft) offset, continues at an outward angle of 45° from vertical through any soil, spoil, or unconsolidated material, and continues at an outward angle of 20° from vertical to the seam of interest (the G7 in the case of South Taylor). For example, the distance around all points of a transmission line support, underlain by 100 ft of spoil and 200 ft of bedrock would be:

$$30 + 100 \tan 45 + 200 \tan 20 = 203 \text{ ft}$$

For areas where the depth to bedrock is unknown and/or difficult to determine, AAI recommends an offset based on a fixed 50-ft offset plus an angle of 25°, resulting in an offset of 190 ft for the above example. This alternative is more conservative for thinner depths to bedrock, but less conservative for thicker depths.

Thank you for the continued opportunity to assist with HWM planning at Colowyo. Please let me know if you have any comments or questions.

Best regards,

Tom Vandergrift
Vice President and Principal
tomvdg@agapito.com

TLV:klg

Attachments: Figures 1–6

Transmitted as a PDF via e-mail to lsampson@tristategt.org

[7] Peng, S. S. (1992), "Surface Subsidence Engineering," Society for Mining, Metallurgy, and Exploration, Inc., Littleton, Colorado, pp. 78–79.

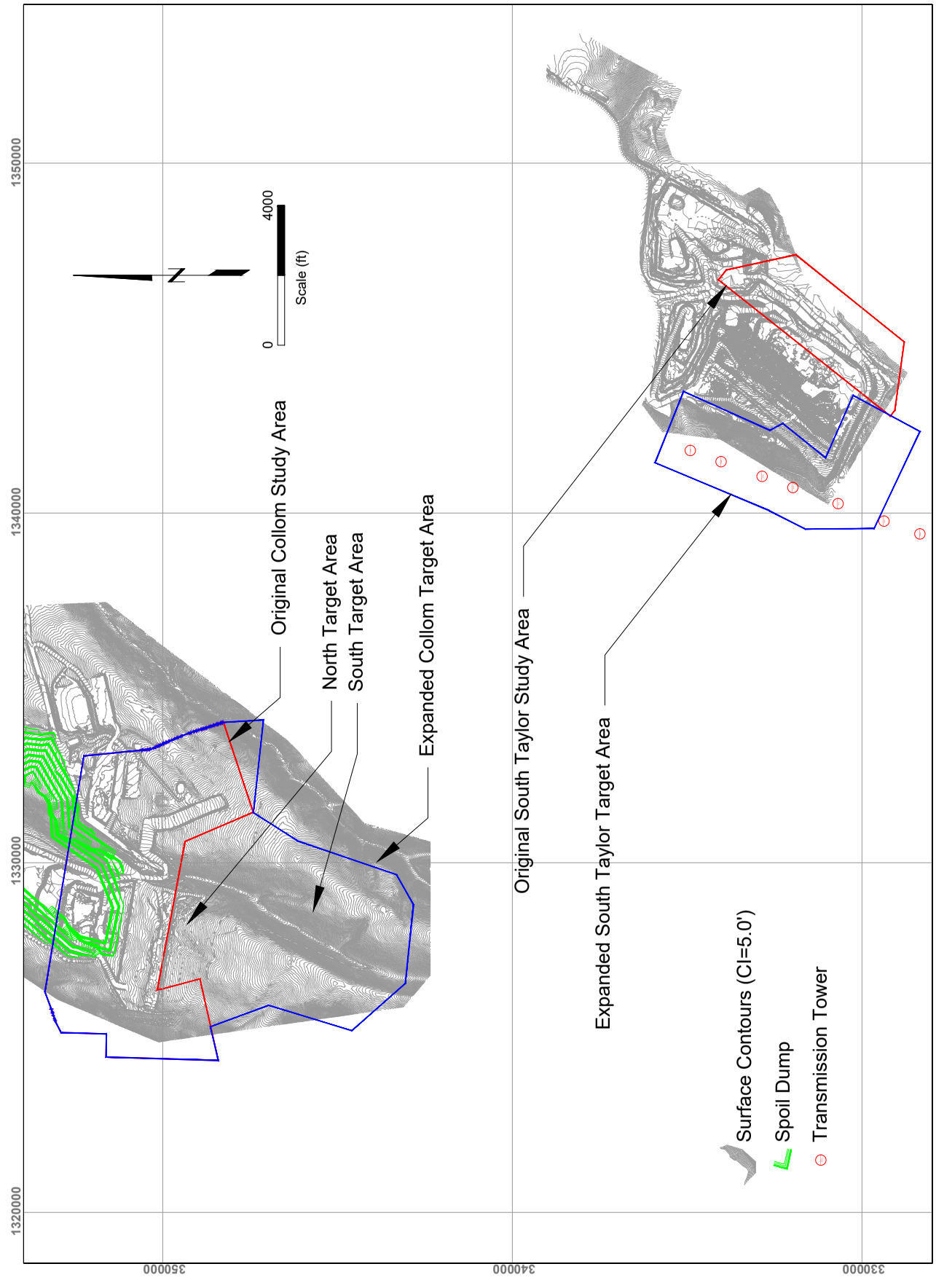

Figure 1. HWM Location Map

Design Depth of Cover, ft	Mining Height, ft												
	6	7.25	8.5	9.75	11	12.25	13.5	14.75	16	17.25	18.5	19.75	21
100	*72*	*87*	*102*	*117*	*132*	*147*	*162*	*177*	*192*	*207*	*222*	*237*	*252*
140	*72*	*87*	*102*	*117*	*132*	*147*	*162*	*177*	*192*	*207*	*222*	*237*	*252*
180	*72*	*87*	*102*	*117*	*132*	*147*	*162*	*177*	*192*	*207*	*222*	*237*	*252*
220	78	*87*	*102*	*117*	*132*	*147*	*162*	*177*	*192*	*207*	*222*	*237*	*252*
260	92	99	106	*117*	*132*	*147*	*162*	*177*	*192*	*207*	*222*	*237*	*252*
300	105	116	122	130	138	*147*	*162*	*177*	*192*	*207*	*222*	*237*	*252*
340	115	128	140	151	158	166	174	183	*192*	*207*	*222*	*237*	*252*
380	127	141	154	167	180	192	201	209	216	225	234	243	*252*
420	139	154	169	183	198	212	226	240	252	261	270	278	287
460	151	168	184	199	216	232	248	264	279	294	309	324	334
500	162	181	200	217	234	252	270	288	305	323	340	357	374
540	174	195	215	234	253	272	292	312	332	351	371	390	409
580	185	208	230	251	272	292	314	336	358	380	402	423	445

Coal strength, psi 900 **Mining width, ft** 11.50 **No. web pillars** 19

Pillar widths in italics have width-to-height ratios of 1.0

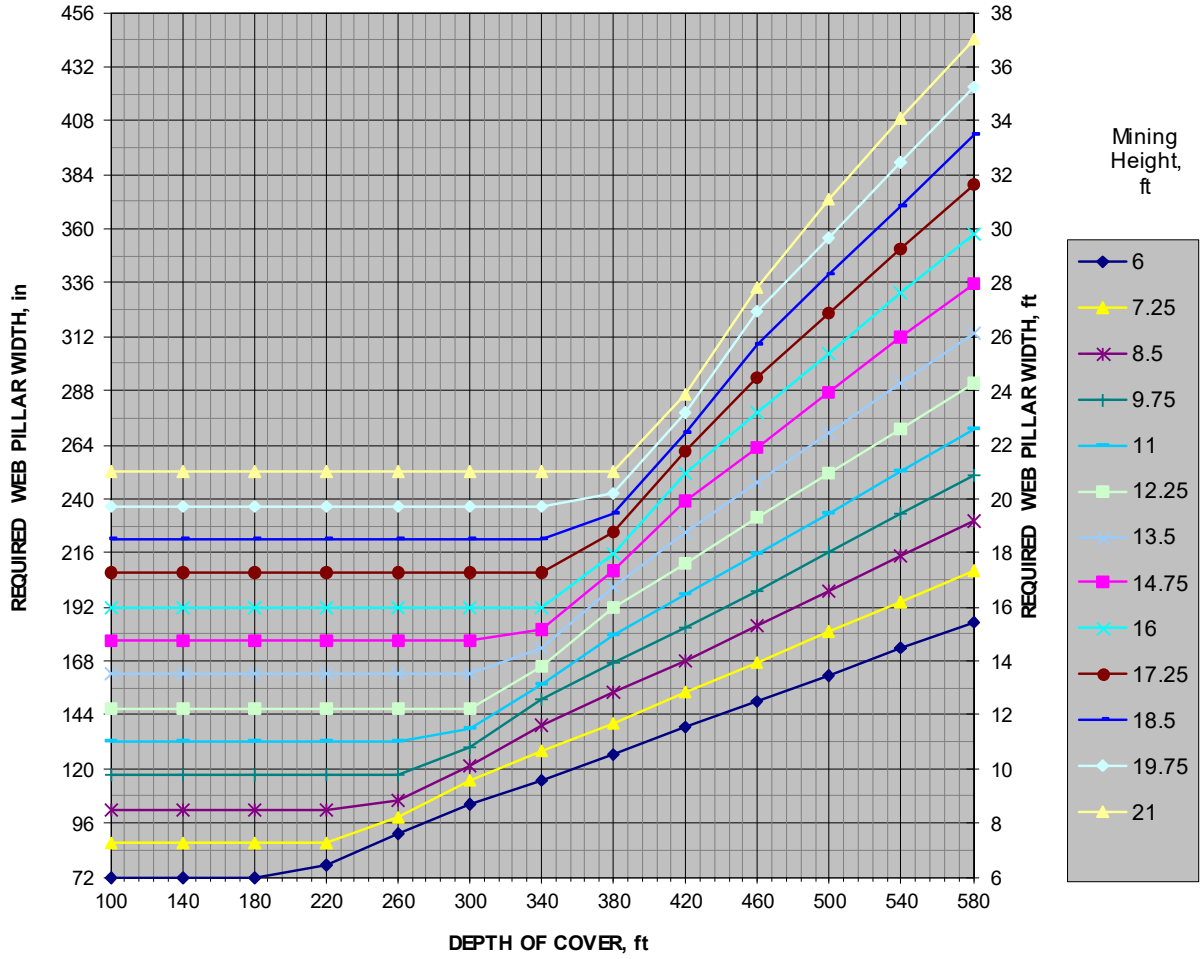

Figure 2a. Web Pillar Design Chart—South Taylor G78 Seam

Design Depth of Cover, ft	Mining Height, ft												
	6	7.25	8.5	9.75	11	12.25	13.5	14.75	16	17.25	18.5	19.75	21
100	8.4	9.1	9.6	10.2	*11.0*	*12.3*	*13.5*	*14.8*	*16.0*	*17.3*	*18.5*	*19.8*	*21.0*
140	13.0	14.1	15.1	16.0	16.9	17.7	18.4	19.1	19.7	20.4	20.9	21.5	22.0
180	17.6	19.2	20.7	22.1	23.4	24.5	25.7	26.7	27.7	28.7	29.6	30.5	31.3
220	22.3	24.4	26.4	28.2	29.9	31.5	33.0	34.5	35.8	37.2	38.4	39.7	40.8
260	24.3	29.0	32.1	34.4	36.5	38.5	40.4	42.3	44.0	45.7	47.4	48.9	50.5
300	26.9	29.8	34.1	39.0	43.1	45.6	47.9	50.1	52.3	54.4	56.4	58.3	60.2
340	30.5	33.8	36.9	40.0	44.4	49.0	54.0	58.0	60.6	63.0	65.4	67.7	69.9
380	34.4	37.9	41.4	44.7	47.9	51.0	55.2	59.6	64.0	69.0	74.0	77.1	79.7
420	38.5	42.3	45.9	49.6	53.2	56.7	60.0	63.3	66.7	71.3	75.8	80.3	84.7
460	42.4	46.8	50.8	54.5	58.5	62.4	66.2	69.8	73.4	76.8	80.2	83.7	88.4
500	46.5	51.2	55.7	59.8	63.8	68.1	72.3	76.3	80.3	84.2	87.9	91.7	95.3
540	50.5	55.7	60.5	65.1	69.3	73.8	78.4	82.8	87.2	91.5	95.7	99.8	103.8
580	54.5	60.1	65.4	70.3	75.0	79.5	84.5	89.3	94.1	98.8	103.4	107.9	112.3

Coal strength, psi 900 **Mining width, ft** 11.50 **No. web pillars** 19

Pillar widths in italics have width-to-height ratios of 1.0

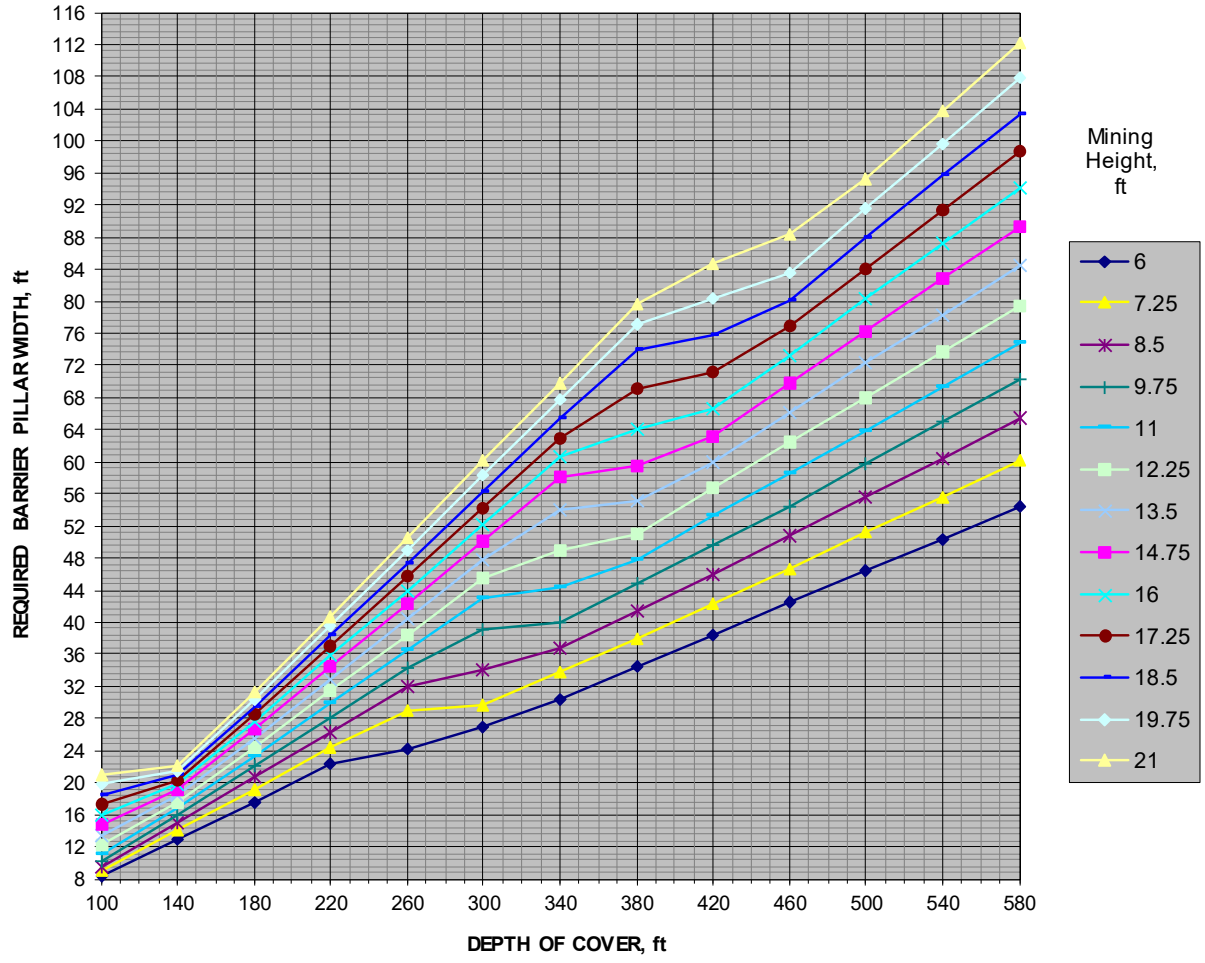

Figure 2b. Barrier Pillar Design Chart—South Taylor G78 Seam

Design Depth of Cover, ft	Mining Height, ft												
	6.0	7.25	8.5	9.75	11	12.25	13.5	14.75	16	17.25	18.5	19.75	21
100	65.3	61.0	57.3	54.1	51.1	48.4	46.0	43.8	41.8	40.0	38.3	36.8	35.4
140	64.4	60.2	56.6	53.3	50.4	47.9	45.6	43.4	41.5	39.8	38.2	36.7	35.3
180	63.6	59.4	55.8	52.6	49.7	47.2	44.9	42.8	40.9	39.2	37.6	36.2	34.8
220	61.2	58.7	55.0	51.9	49.1	46.5	44.3	42.2	40.4	38.7	37.1	35.7	34.3
260	57.5	55.3	53.5	51.2	48.4	45.9	43.7	41.6	39.8	38.1	36.6	35.2	33.8
300	54.4	51.9	50.3	48.4	46.8	45.2	43.0	41.0	39.2	37.6	36.1	34.7	33.4
340	52.0	49.3	47.1	45.2	43.8	42.4	41.1	39.8	38.7	37.1	35.6	34.2	32.9
380	49.4	46.8	44.6	42.7	40.9	39.3	38.1	37.1	36.2	35.1	34.1	33.2	32.5
420	47.1	44.6	42.3	40.4	38.5	37.0	35.5	34.2	33.1	32.2	31.4	30.6	29.9
460	45.0	42.4	40.2	38.4	36.5	34.9	33.4	32.0	30.9	29.8	28.8	27.8	27.1
500	43.2	40.5	38.2	36.3	34.6	33.0	31.5	30.2	29.0	27.9	26.9	25.9	25.1
540	41.4	38.7	36.5	34.6	32.9	31.3	29.8	28.5	27.3	26.2	25.2	24.3	23.4
580	39.8	37.1	34.9	33.0	31.3	29.8	28.3	27.0	25.8	24.7	23.7	22.8	22.0

Coal strength, psi 900 **Mining width, ft** 11.50 **No. web pillars** 19

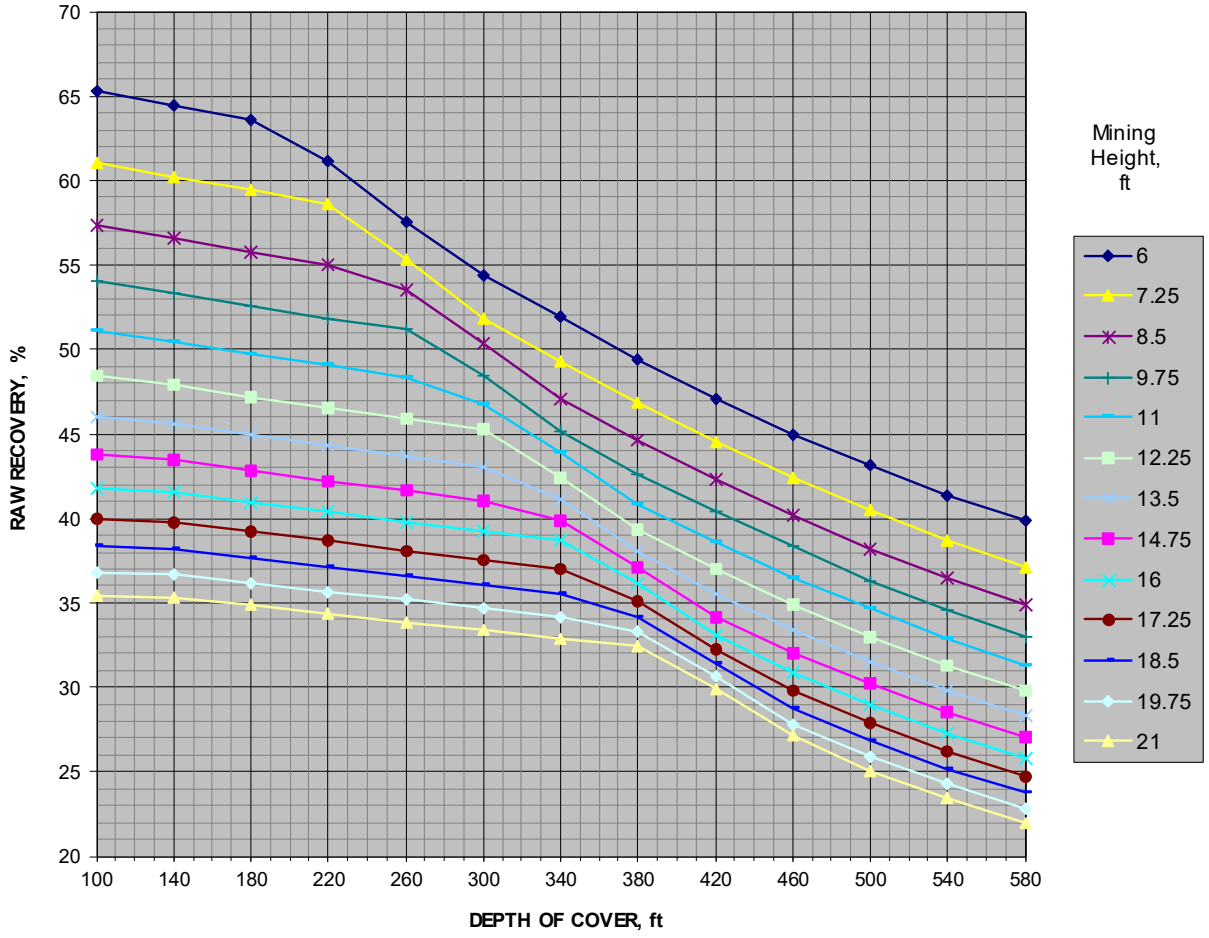

Figure 2c. Raw Recovery—South Taylor G78 Seam

Design Depth of Cover, ft	Mining Height, ft												
	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9
110	49	53	58	62	66	70	73	77	81	84	87	91	94
130	55	59	64	68	73	77	81	85	89	93	97	101	104
150	62	66	70	74	79	84	89	93	98	102	106	110	114
170	68	73	78	82	86	91	96	101	106	110	115	120	124
190	74	80	85	90	95	99	104	108	113	119	124	129	134
210	80	86	92	98	103	108	113	118	122	127	132	137	143
230	86	93	99	106	112	117	123	128	133	138	143	148	152
250	91	99	106	113	120	126	132	138	144	149	155	160	165
270	97	105	113	121	128	135	142	148	154	161	166	172	178
290	103	112	120	128	136	144	151	158	165	172	178	185	191
310	108	118	127	136	144	152	160	168	175	183	190	197	204
330	113	124	134	143	152	161	170	178	186	194	202	209	217
350	119	130	140	150	160	170	179	188	196	205	213	221	229

Coal strength, psi 495 **Mining width, ft** 11.50 **No. web pillars** 19

Pillar widths in italics have width-to-height ratios of 0.8

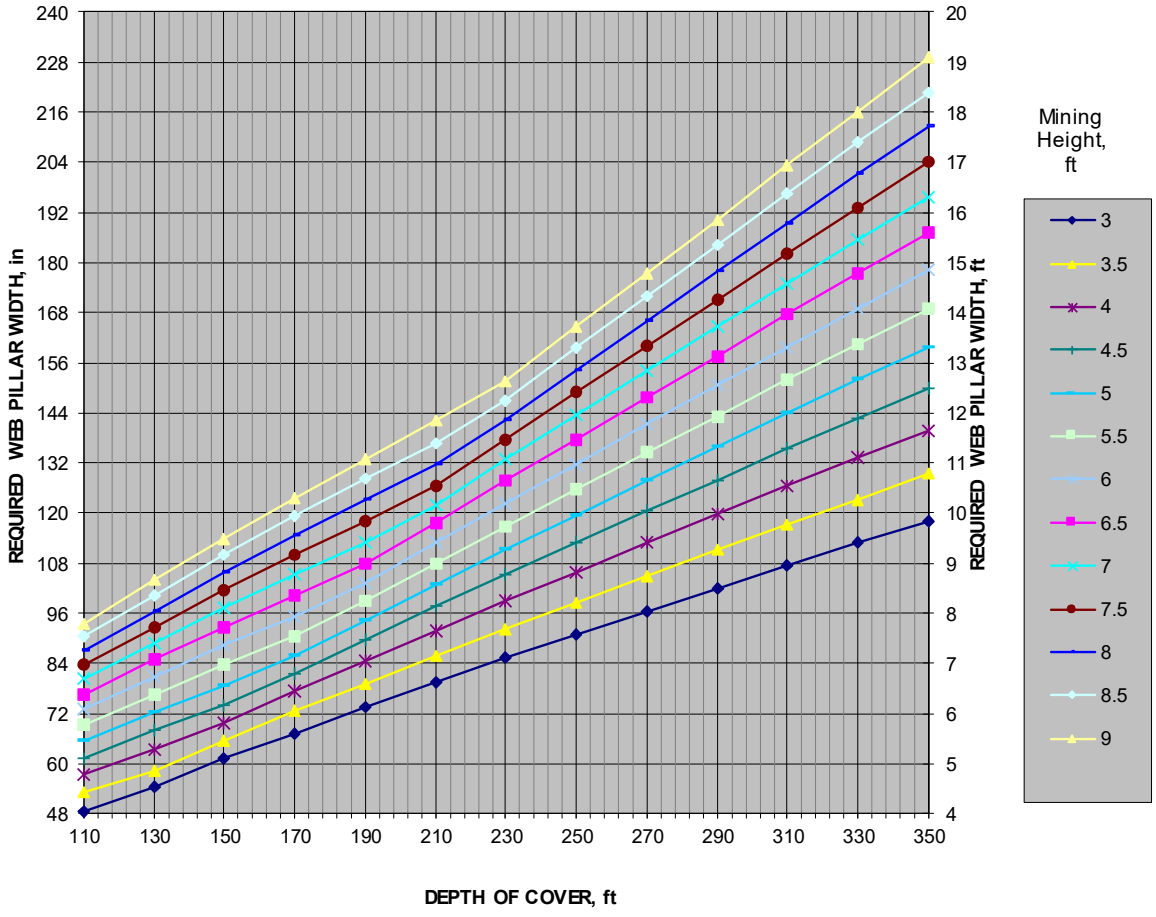

Figure 3a. Web Pillar Design Chart—Collom B2/B3 Seam

Design Depth of Cover, ft	Mining Height, ft												
	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9
110	10.0	10.8	11.5	12.2	12.8	13.4	13.9	14.4	14.9	15.4	15.9	16.4	16.8
130	12.0	13.1	14.0	14.8	15.6	16.3	17.1	17.7	18.4	19.0	19.6	20.2	20.7
150	12.0	14.0	16.0	17.5	18.5	19.3	20.2	21.0	21.8	22.6	23.3	24.0	24.7
170	13.8	14.9	16.0	18.0	20.0	22.0	23.4	24.3	25.3	26.2	27.1	27.9	28.7
190	15.6	16.8	18.0	19.1	20.1	22.0	24.0	26.0	28.0	29.8	30.8	31.8	32.8
210	17.4	18.8	20.1	21.4	22.5	23.6	24.7	26.0	28.0	30.0	32.0	34.0	36.0
230	19.3	20.8	22.3	23.6	24.9	26.2	27.4	28.5	29.6	30.7	32.0	34.0	36.0
250	21.1	22.8	24.4	25.9	27.4	28.7	30.1	31.3	32.5	33.7	34.9	36.0	37.0
270	22.9	24.8	26.6	28.2	29.8	31.3	32.7	34.1	35.5	36.8	38.0	39.3	40.4
290	24.7	26.8	28.7	30.5	32.2	33.9	35.4	37.0	38.4	39.8	41.2	42.6	43.9
310	26.6	28.8	30.9	32.8	34.7	36.4	38.1	39.8	41.4	42.9	44.4	45.9	47.3
330	28.4	30.8	33.0	35.1	37.1	39.0	40.8	42.6	44.3	46.0	47.6	49.2	50.7
350	30.2	32.8	35.1	37.4	39.5	41.6	43.5	45.4	47.3	49.0	50.8	52.5	54.1

Coal strength, psi 495 **Mining width, ft** 11.50 **No. web pillars** 19

Pillar widths in italics have width-to-height ratios of 0.8

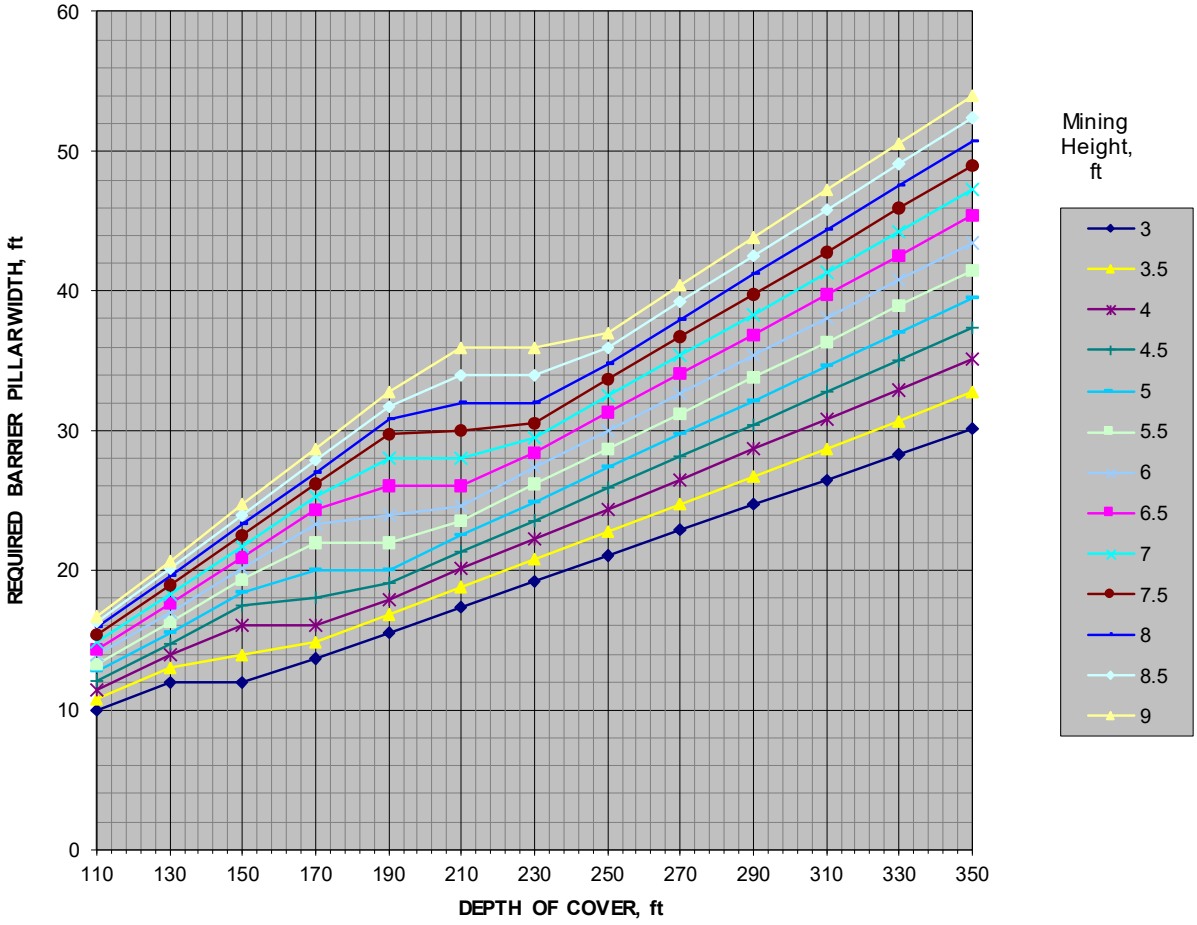

Figure 3b. Barrier Pillar Design Chart—Collom B2/B3 Seam

Design Depth of Cover, ft	Mining Height, ft												
	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9
110	72.4	70.8	69.0	67.6	66.2	64.9	64.0	62.8	61.6	60.8	60.0	58.9	58.1
130	69.9	68.3	66.6	65.3	63.7	62.5	61.3	60.2	59.1	58.0	57.0	56.1	55.4
150	67.6	66.0	64.5	63.1	61.6	60.2	58.8	57.8	56.5	55.5	54.6	53.7	52.8
170	65.4	63.8	62.2	60.9	59.6	58.1	56.7	55.5	54.4	53.4	52.4	51.4	50.5
190	63.4	61.6	60.1	58.7	57.4	56.3	54.9	53.9	52.6	51.3	50.3	49.4	48.4
210	61.5	59.7	58.1	56.6	55.3	54.2	53.0	51.9	51.0	49.9	48.8	47.8	46.7
230	59.7	57.8	56.2	54.6	53.2	52.1	50.9	49.9	48.9	48.0	47.1	46.2	45.4
250	58.2	56.2	54.5	52.9	51.4	50.2	49.0	47.9	46.9	46.0	45.1	44.3	43.5
270	56.6	54.6	52.8	51.1	49.7	48.4	47.2	46.1	45.2	44.1	43.3	42.5	41.6
290	55.1	53.0	51.3	49.7	48.2	46.8	45.6	44.5	43.4	42.4	41.6	40.7	39.9
310	53.8	51.6	49.8	48.1	46.7	45.4	44.1	42.9	41.9	40.9	40.0	39.1	38.3
330	52.6	50.3	48.4	46.8	45.3	43.9	42.6	41.5	40.4	39.4	38.5	37.7	36.8
350	51.3	49.1	47.3	45.6	44.0	42.5	41.3	40.1	39.1	38.1	37.2	36.4	35.6

Coal strength, psi 495 **Mining width, ft** 11.50 **No. web pillars** 19

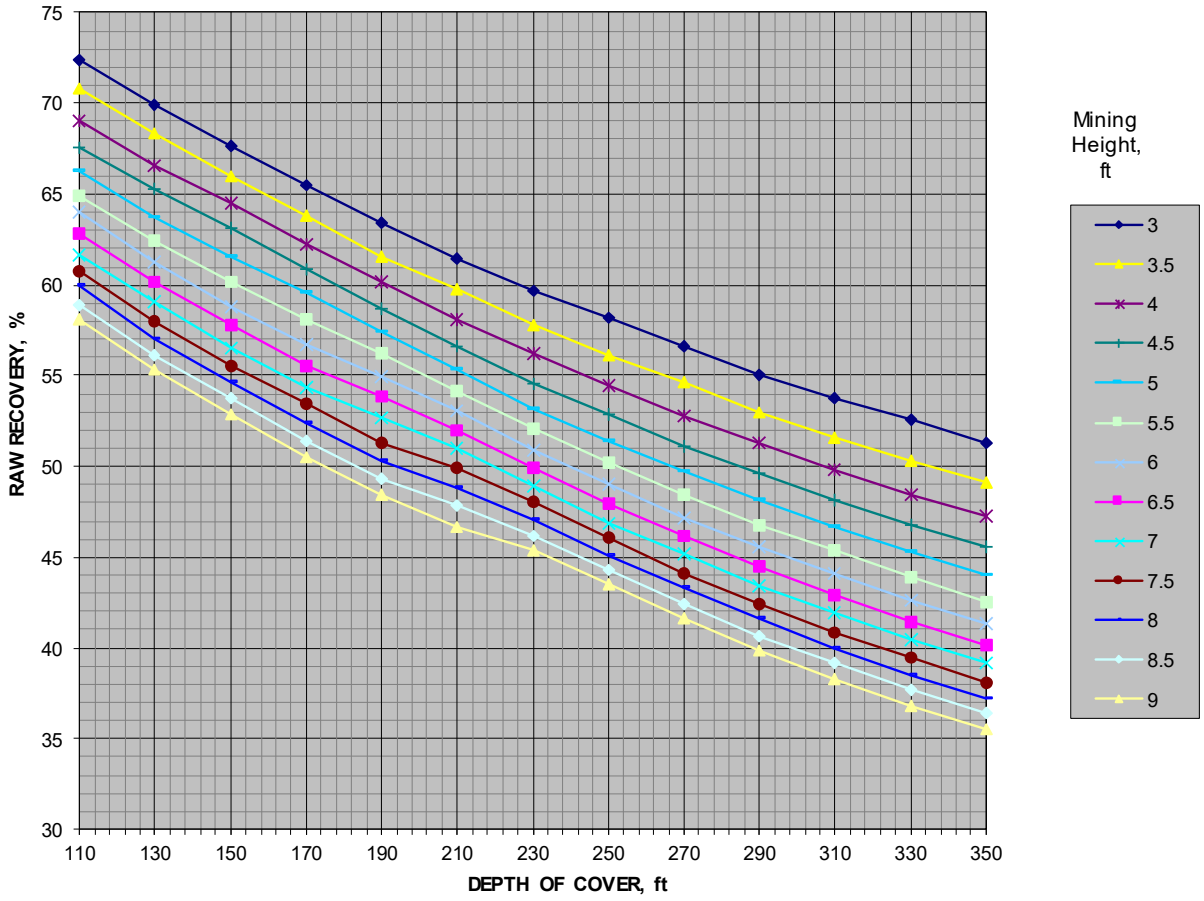

Figure 3c. Raw Recovery—Collom B2/B3 Seam

Design Depth of Cover, ft	Mining Height, ft												
	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11
130	51	54	*58*	*63*	*68*	*72*	*77*	*82*	*87*	*92*	*96*	*101*	*106*
160	58	61	64	67	70	73	*77*	*82*	*87*	*92*	*96*	*101*	*106*
190	64	68	71	75	78	81	85	88	91	94	97	*101*	*106*
220	70	74	78	82	85	89	93	96	100	103	107	110	113
250	75	80	84	88	92	97	101	104	108	112	116	120	123
280	81	85	90	95	99	104	108	112	116	121	125	129	133
310	86	91	96	101	106	111	115	120	124	129	133	138	142
340	94	98	102	107	112	117	122	127	132	137	142	146	151
370	101	105	110	115	119	124	129	135	140	145	150	155	160
400	108	113	118	123	128	132	137	142	147	153	158	163	169
430	114	120	126	131	137	142	147	152	156	161	166	172	177
460	121	128	134	140	145	151	156	162	167	172	177	182	187
490	128	135	142	148	154	160	166	172	178	183	189	194	199

Coal strength, psi 900 **Mining width, ft** 11.50 **No. web pillars** 19

Pillar widths in italics have width-to-height ratios of 0.8

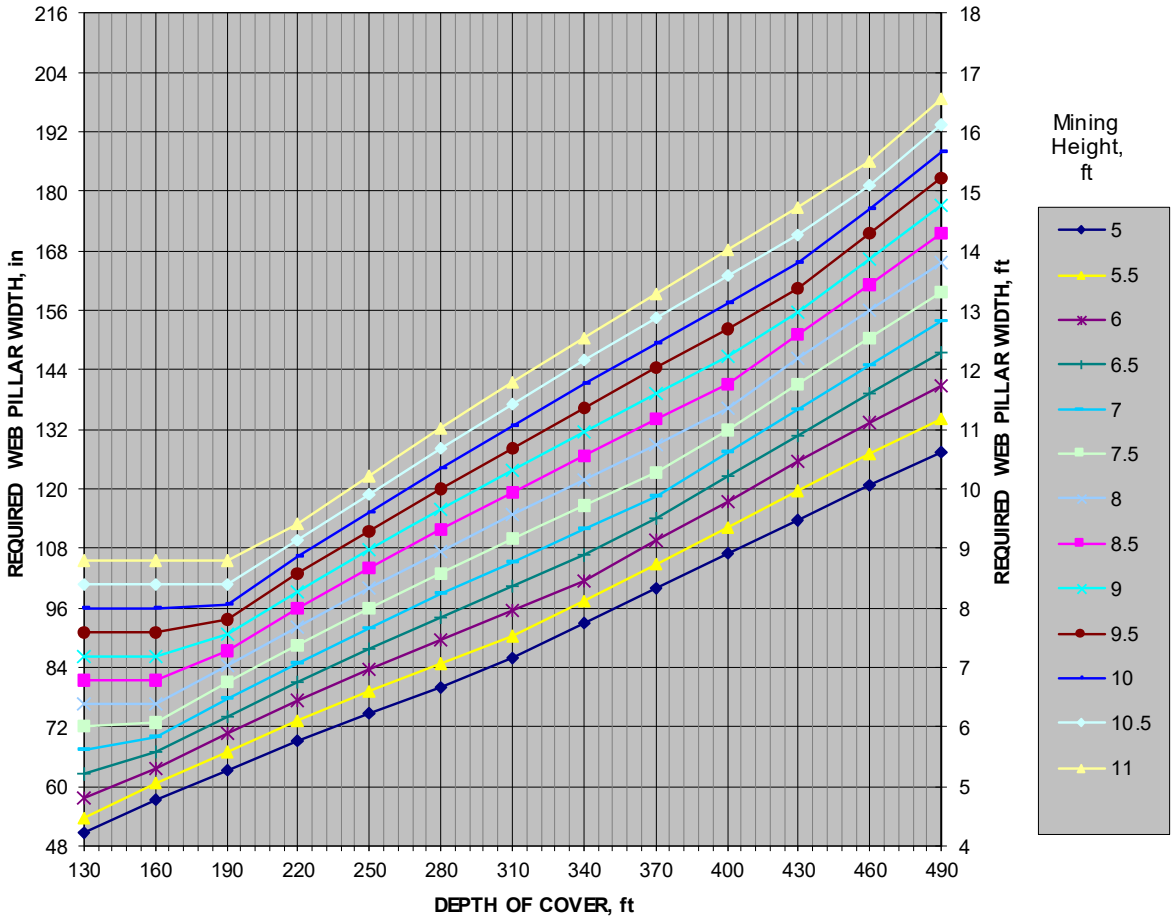

Figure 4a. Web Pillar Design Chart—Collom C3/C5 Seam

Design Depth of Cover, ft	Mining Height, ft												
	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11
130	10.4	10.9	11.3	11.7	12.0	12.4	12.7	13.1	13.4	13.7	14.0	14.4	14.7
160	13.4	14.0	14.6	15.1	15.6	16.1	16.6	17.1	17.5	17.9	18.3	18.7	19.1
190	16.5	17.2	17.9	18.6	19.3	19.9	20.5	21.1	21.7	22.2	22.8	23.3	23.8
220	19.5	20.4	21.3	22.1	22.9	23.7	24.5	25.2	25.9	26.6	27.2	27.9	28.5
250	20.0	22.0	24.0	25.7	26.6	27.5	28.4	29.3	30.1	30.9	31.7	32.5	33.2
280	21.5	22.5	24.0	26.0	28.0	30.0	32.0	33.4	34.4	35.3	36.2	37.1	38.0
310	24.1	25.2	26.3	27.3	28.4	30.0	32.0	34.0	36.0	38.0	40.0	41.8	42.8
340	26.7	27.9	29.2	30.4	31.5	32.6	33.6	34.7	36.0	38.0	40.0	42.0	44.0
370	29.3	30.7	32.1	33.4	34.6	35.8	37.0	38.2	39.3	40.3	41.4	42.4	44.0
400	31.9	33.4	34.9	36.4	37.8	39.1	40.4	41.7	42.9	44.1	45.2	46.4	47.5
430	34.5	36.2	37.8	39.4	40.9	42.4	43.8	45.2	46.5	47.8	49.1	50.3	51.5
460	37.1	39.0	40.7	42.4	44.1	45.6	47.2	48.7	50.1	51.5	52.9	54.3	55.6
490	39.7	41.7	43.6	45.4	47.2	48.9	50.6	52.2	53.7	55.3	56.8	58.2	59.6

Coal strength, psi 900 **Mining width, ft** 11.50 **No. web pillars** 19

Pillar widths in italics have width-to-height ratios of 0.8

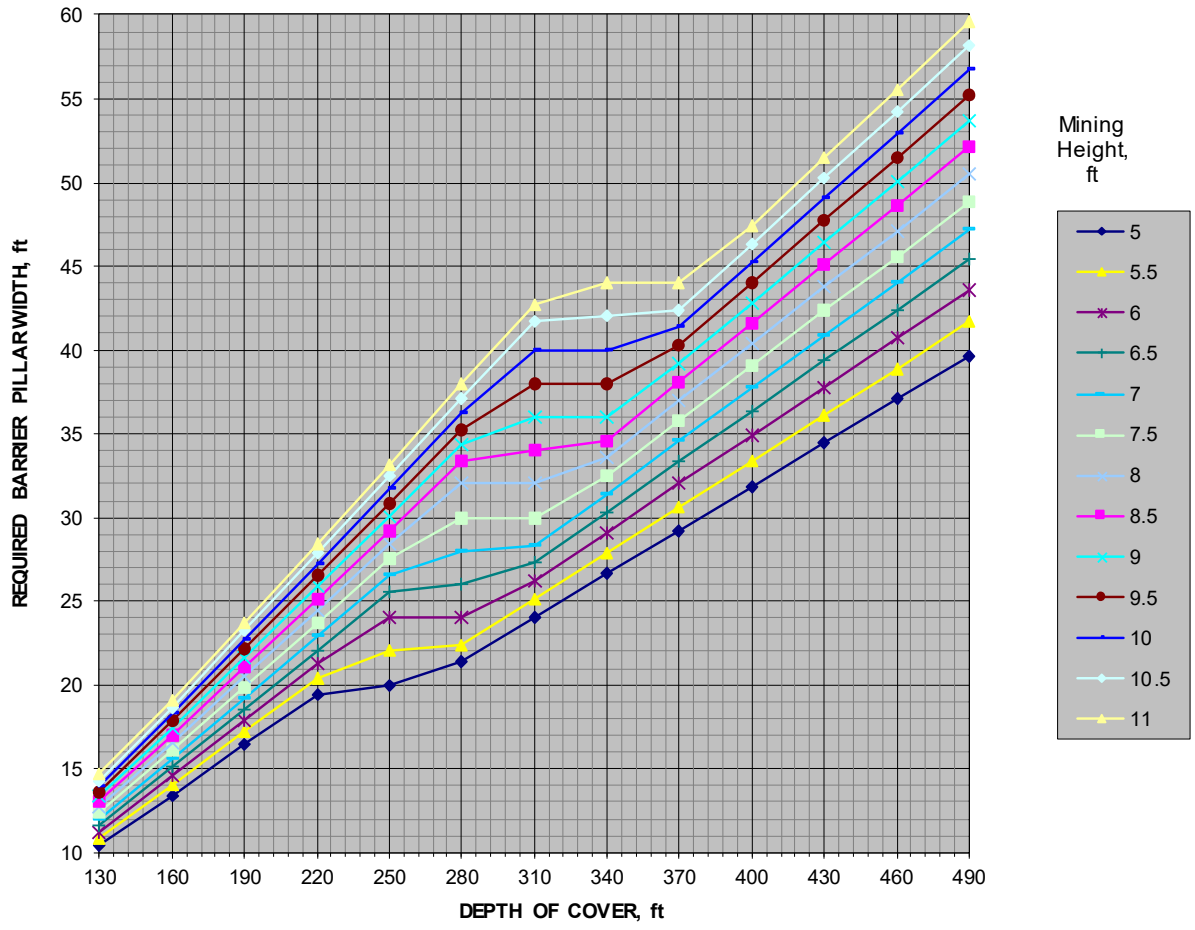

Figure 4b. Barrier Pillar Design Chart—Collom C3/C5 Seam

Design Depth of Cover, ft	Mining Height, ft												
	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11
130	71.6	70.5	69.0	67.4	65.8	64.5	63.1	61.7	60.3	59.1	58.1	56.9	55.8
160	68.6	67.5	66.5	65.5	64.5	63.6	62.4	61.0	59.7	58.4	57.5	56.3	55.2
190	66.1	64.8	63.8	62.6	61.7	60.8	59.7	58.9	58.1	57.4	56.6	55.7	54.5
220	63.8	62.6	61.4	60.2	59.4	58.3	57.2	56.5	55.5	54.8	53.9	53.2	52.6
250	62.4	60.7	59.4	58.2	57.2	55.9	55.0	54.2	53.4	52.5	51.6	50.8	50.2
280	60.6	59.4	58.0	56.6	55.5	54.2	53.1	52.2	51.3	50.3	49.6	48.8	48.1
310	58.9	57.6	56.3	55.1	54.0	52.8	51.8	50.7	49.7	48.7	47.9	46.9	46.2
340	56.7	55.7	54.7	53.5	52.4	51.4	50.4	49.4	48.4	47.4	46.5	45.7	44.8
370	54.9	53.9	52.7	51.6	50.8	49.8	48.8	47.7	46.8	46.0	45.2	44.4	43.6
400	53.1	52.0	50.9	49.9	48.9	48.1	47.2	46.3	45.5	44.5	43.8	43.0	42.2
430	51.7	50.4	49.2	48.2	47.1	46.3	45.4	44.6	43.9	43.2	42.4	41.6	40.9
460	50.1	48.8	47.6	46.6	45.7	44.7	43.9	43.0	42.2	41.5	40.8	40.2	39.5
490	48.7	47.4	46.1	45.1	44.1	43.2	42.3	41.5	40.7	40.0	39.2	38.6	38.0

Coal strength, psi 900 **Mining width, ft** 11.50 **No. web pillars** 19

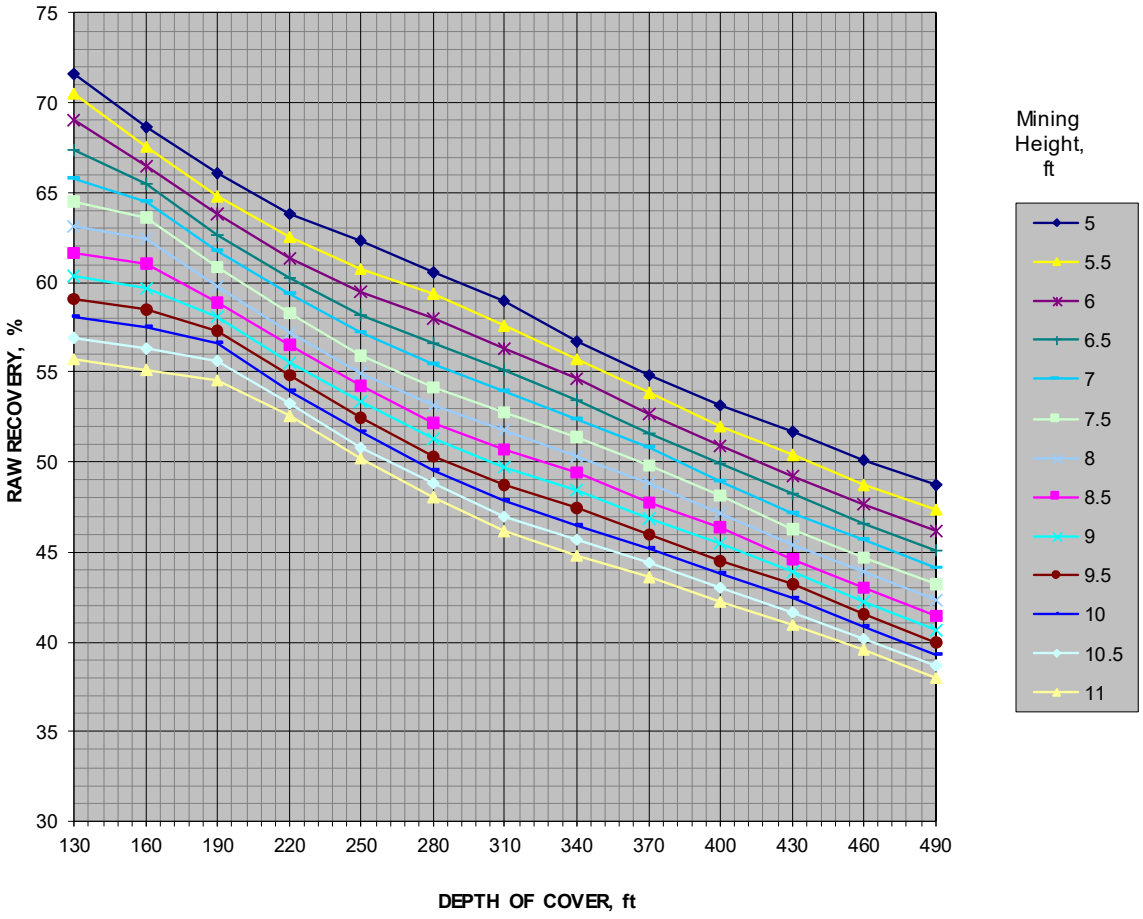

Figure 4c. Raw Recovery—Collom C3/C5 Seam

Design Depth of Cover, ft	Mining Height, ft												
	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13
190	83	86	90	93	96	100	103	106	110	113	116	*120*	*125*
210	88	92	95	99	103	106	110	113	117	120	124	127	130
230	93	97	101	105	109	113	116	120	124	128	131	135	138
250	98	102	107	111	115	119	123	127	131	135	139	142	146
270	103	107	112	116	121	125	129	134	138	142	146	150	154
290	108	112	117	122	126	131	136	140	144	149	153	157	162
310	112	117	122	127	132	137	142	146	151	156	160	165	169
330	117	122	127	133	138	143	148	153	158	162	167	172	177
350	123	127	132	138	143	148	154	159	164	169	174	179	184
370	129	134	139	143	149	154	160	165	170	176	181	186	191
390	136	141	146	151	156	160	165	171	177	182	188	193	199
410	142	148	153	158	163	168	173	178	183	189	194	200	206
430	149	155	160	166	171	176	181	186	191	196	201	207	213

Coal strength, psi 821 **Mining width, ft** 11.50 **No. web pillars** 19

Pillar widths in italics have width-to-height ratios of 0.8

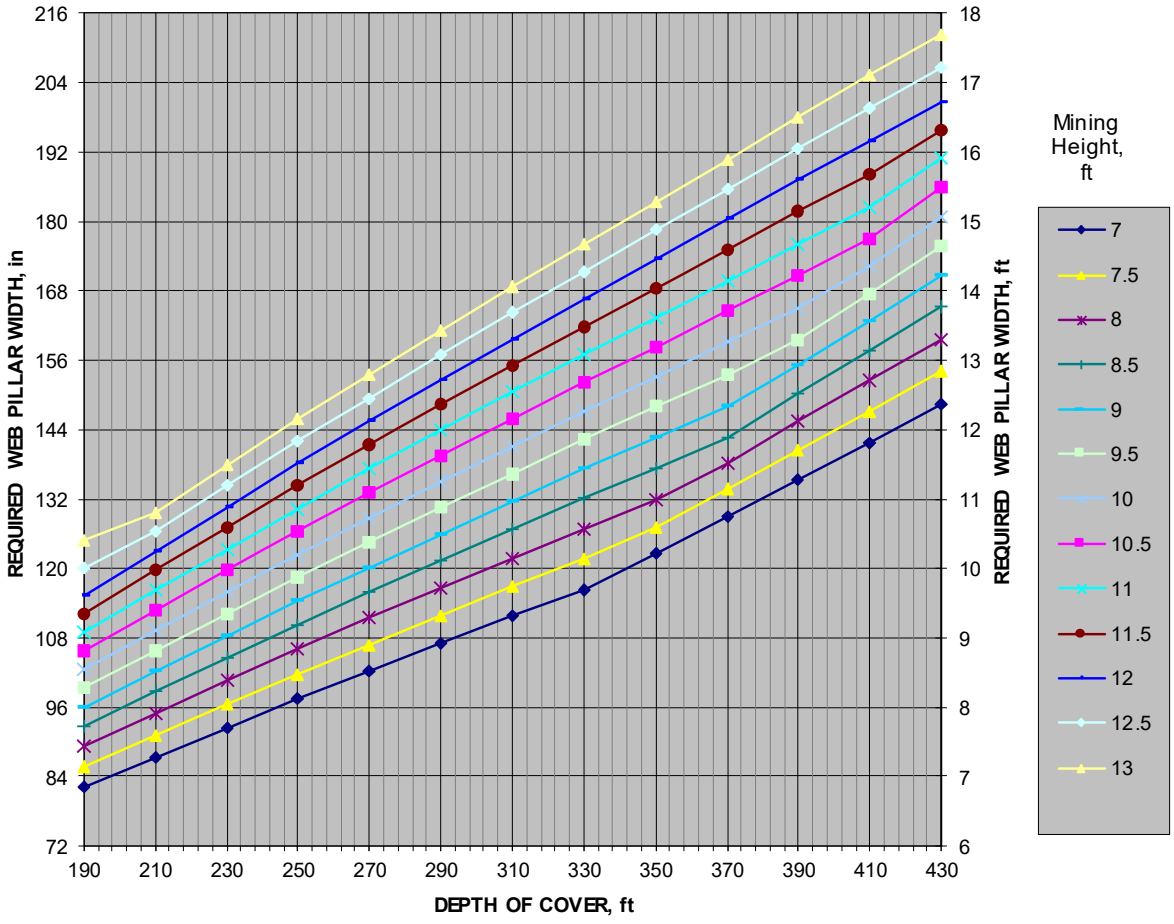

Figure 5a. Web Pillar Design Chart—Collom D1/D2 Seam

Design Depth of Cover, ft	Mining Height, ft												
	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13
190	20.5	21.2	21.9	22.5	23.1	23.7	24.3	24.9	25.4	25.9	26.5	27.0	27.5
210	23.1	23.9	24.6	25.4	26.1	26.8	27.4	28.1	28.7	29.3	29.9	30.5	31.1
230	25.7	26.6	27.4	28.2	29.0	29.8	30.6	31.3	32.1	32.8	33.5	34.1	34.8
250	28.0	29.2	30.2	31.1	32.0	32.9	33.8	34.6	35.4	36.2	37.0	37.7	38.5
270	28.0	30.0	32.0	34.0	35.0	36.0	36.9	37.9	38.8	39.6	40.5	41.3	42.2
290	28.0	30.0	32.0	34.0	36.0	38.0	40.0	41.1	42.1	43.1	44.0	45.0	45.9
310	30.0	31.1	32.1	34.0	36.0	38.0	40.0	42.0	44.0	46.0	47.6	48.6	49.6
330	32.3	33.4	34.5	35.5	36.6	38.0	40.0	42.0	44.0	46.0	48.0	50.0	52.0
350	34.5	35.7	36.8	38.0	39.1	40.2	41.2	42.2	44.0	46.0	48.0	50.0	52.0
370	36.7	38.0	39.2	40.4	41.6	42.8	43.9	45.0	46.1	47.1	48.2	50.0	52.0
390	38.9	40.3	41.6	42.9	44.2	45.4	46.6	47.8	48.9	50.1	51.2	52.2	53.3
410	41.1	42.5	44.0	45.4	46.7	48.0	49.3	50.6	51.8	53.0	54.2	55.3	56.4
430	43.3	44.8	46.4	47.8	49.3	50.7	52.0	53.3	54.6	55.9	57.2	58.4	59.6

Coal strength, psi 821 **Mining width, ft** 11.50 **No. web pillars** 19

Pillar widths in italics have width-to-height ratios of 0.8

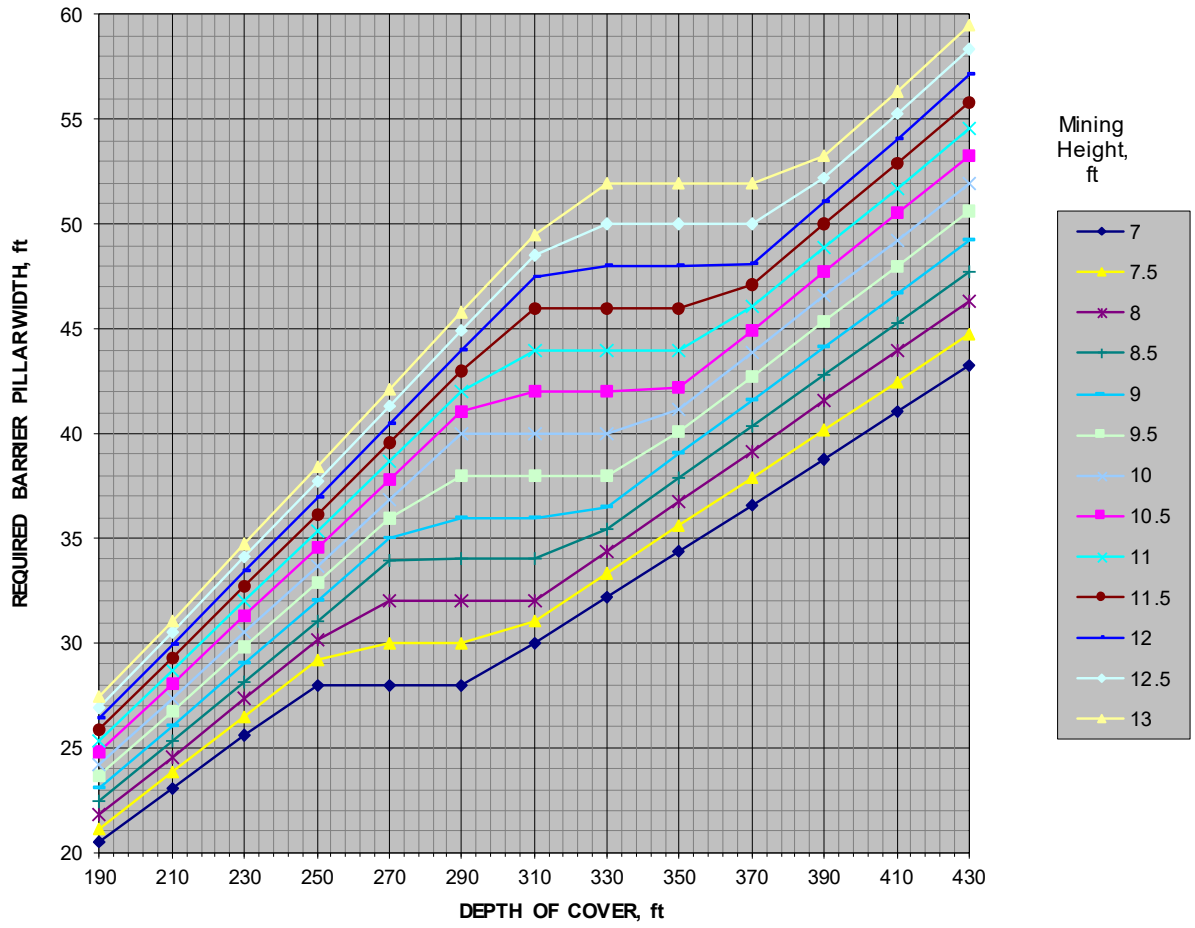

Figure 5b. Barrier Pillar Design Chart—Collom D1/D2 Seam

Design Depth of Cover, ft	Mining Height, ft												
	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13
190	60.2	59.4	58.3	57.5	56.8	55.8	55.1	54.4	53.5	52.9	52.3	51.5	50.5
210	58.6	57.6	56.8	55.8	54.9	54.2	53.3	52.6	51.8	51.2	50.4	49.8	49.3
230	57.1	56.1	55.1	54.2	53.3	52.4	51.8	51.0	50.2	49.4	48.8	48.1	47.6
250	55.7	54.7	53.5	52.6	51.8	51.0	50.2	49.4	48.6	47.9	47.2	46.7	46.0
270	54.6	53.6	52.4	51.4	50.4	49.6	48.8	47.9	47.2	46.5	45.8	45.2	44.6
290	53.6	52.6	51.4	50.3	49.4	48.4	47.4	46.7	46.0	45.2	44.6	43.9	43.2
310	52.6	51.5	50.5	49.5	48.4	47.4	46.5	45.7	44.8	44.0	43.3	42.6	42.0
330	51.4	50.4	49.4	48.3	47.4	46.5	45.6	44.7	43.9	43.2	42.4	41.6	40.9
350	50.1	49.3	48.3	47.3	46.4	45.6	44.7	43.9	43.1	42.3	41.6	40.8	40.1
370	48.8	47.9	47.0	46.3	45.3	44.5	43.6	42.9	42.2	41.4	40.7	40.0	39.4
390	47.5	46.6	45.7	44.9	44.1	43.5	42.8	41.9	41.1	40.5	39.7	39.1	38.4
410	46.4	45.4	44.6	43.8	43.0	42.3	41.6	40.9	40.2	39.5	38.9	38.2	37.5
430	45.2	44.2	43.4	42.5	41.8	41.1	40.5	39.8	39.2	38.6	38.0	37.3	36.7

Coal strength, psi 821 **Mining width, ft** 11.50 **No. web pillars** 19

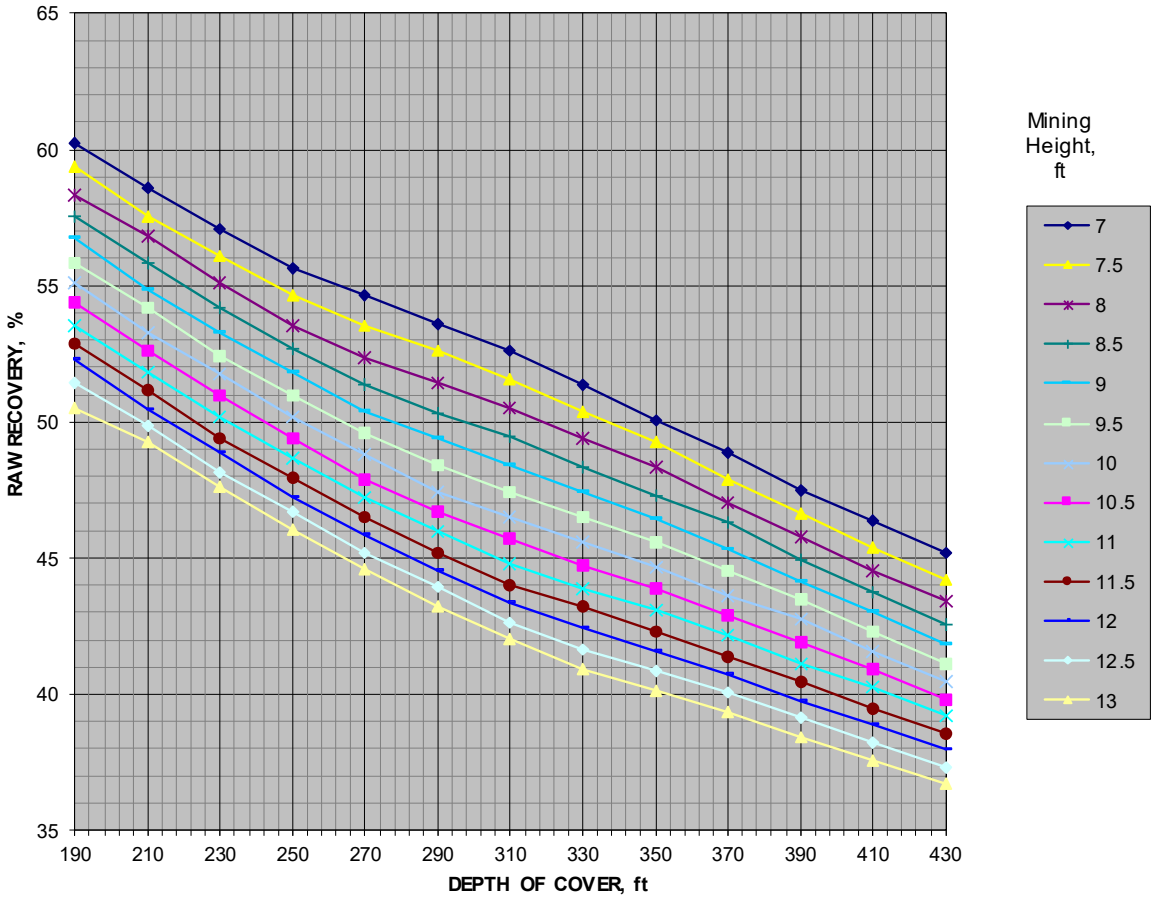

Figure 5c. Raw Recovery—Collom D1/D2 Seam

Design Depth of Cover, ft	Mining Height, ft												
	4	4.33	4.67	5	5.33	5.67	6	6.33	6.67	7	7.33	7.67	8
140	47	49	51	54	56	58	59	61	*65*	*68*	*71*	*74*	*77*
170	53	55	58	60	62	64	67	69	71	73	75	77	79
200	58	61	63	66	68	71	73	76	78	81	83	85	87
230	63	66	69	72	74	77	80	83	85	88	90	93	95
260	67	71	74	77	80	83	86	89	92	95	97	100	103
290	74	76	79	82	86	89	92	95	98	101	104	107	110
320	80	83	86	89	92	95	98	101	105	108	111	114	118
350	86	89	93	96	99	102	105	108	111	114	118	121	125
380	92	96	99	103	106	110	113	116	119	122	125	128	132
410	98	102	106	110	114	117	121	124	128	131	134	137	140
440	104	108	112	117	121	125	129	132	136	140	143	147	150
470	109	114	119	123	128	132	136	140	144	148	152	156	160
500	115	120	125	130	135	140	144	148	153	157	161	165	169

Coal strength, psi 900 **Mining width, ft** 11.50 **No. web pillars** 19

Pillar widths in italics have width-to-height ratios of 0.8

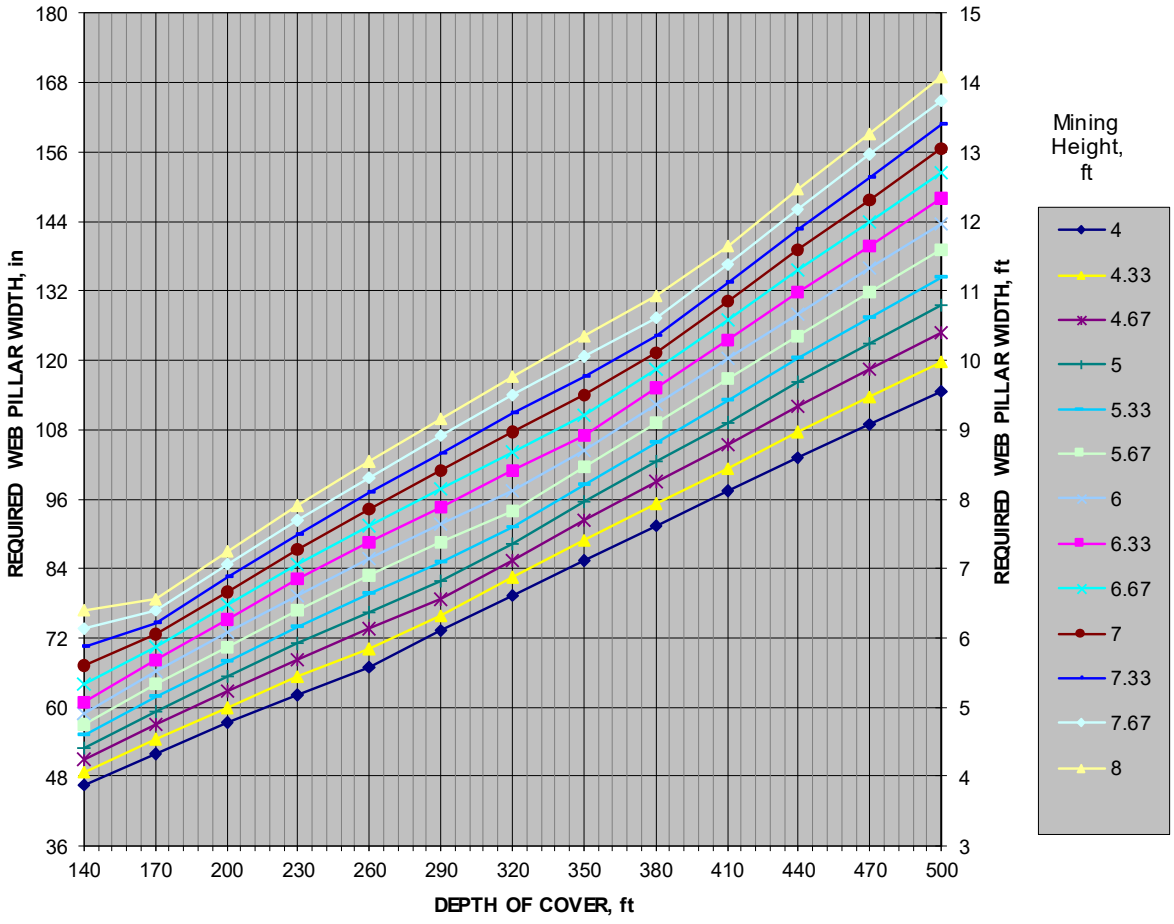

Figure 6a. Web Pillar Design Chart—Collom E2 Seam

Design Depth of Cover, ft	Mining Height, ft												
	4	4.33	4.67	5	5.33	5.67	6	6.33	6.67	7	7.33	7.67	8
140	10.4	10.7	11.1	11.4	11.8	12.1	12.4	12.7	13.0	13.2	13.5	13.8	14.0
170	13.0	13.5	14.0	14.4	14.9	15.3	15.7	16.1	16.5	16.9	17.2	17.6	17.9
200	15.7	16.3	16.9	17.5	18.0	18.6	19.1	19.6	20.0	20.5	21.0	21.4	21.8
230	16.0	17.4	18.7	20.0	21.2	21.8	22.4	23.0	23.6	24.2	24.7	25.3	25.8
260	17.7	18.4	19.1	20.0	21.4	22.7	24.0	25.4	26.7	27.8	28.5	29.1	29.8
290	20.0	20.8	21.6	22.3	23.0	23.7	24.4	25.4	26.7	28.0	29.4	30.7	32.0
320	22.3	23.2	24.1	24.9	25.7	26.5	27.3	28.0	28.7	29.4	30.1	30.7	32.0
350	24.6	25.6	26.6	27.5	28.4	29.3	30.1	31.0	31.8	32.5	33.3	34.0	34.8
380	27.0	28.0	29.1	30.1	31.1	32.1	33.0	33.9	34.8	35.7	36.5	37.4	38.1
410	29.3	30.5	31.6	32.7	33.8	34.9	35.9	36.9	37.9	38.8	39.7	40.7	41.5
440	31.6	32.9	34.2	35.4	36.5	37.7	38.8	39.9	40.9	42.0	43.0	44.0	44.9
470	33.9	35.3	36.7	38.0	39.2	40.5	41.7	42.8	44.0	45.1	46.2	47.3	48.3
500	36.2	37.7	39.2	40.6	41.9	43.3	44.6	45.8	47.1	48.3	49.4	50.6	51.7

Coal strength, psi 900 **Mining width, ft** 11.50 **No. web pillars** 19

Pillar widths in italics have width-to-height ratios of 0.8

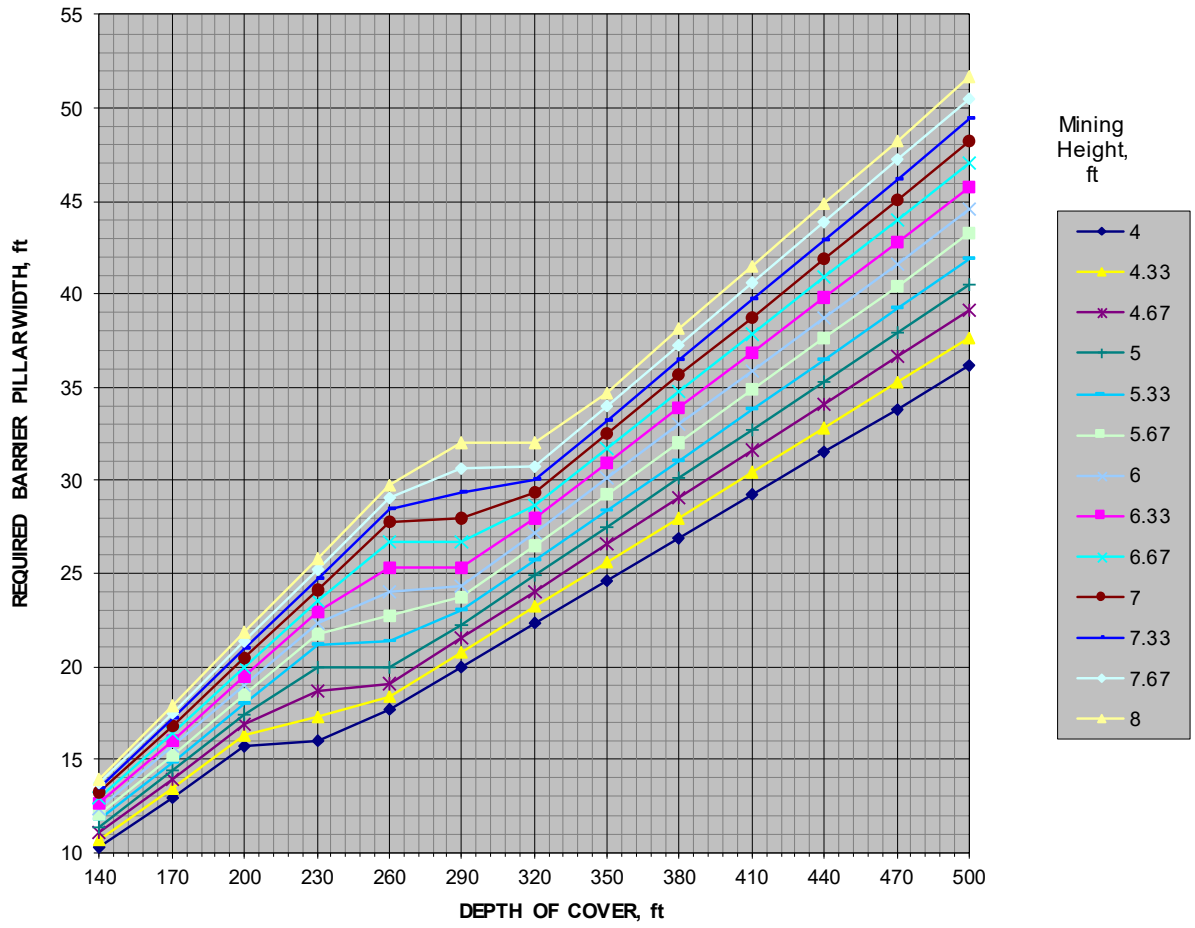

Figure 6b. Barrier Pillar Design Chart—Collom E2 Seam

Design	Mining Height, ft												
Depth of Cover, ft	4	4.33	4.67	5	5.33	5.67	6	6.33	6.67	7	7.33	7.67	8
140	73.1	72.3	71.5	70.4	69.6	68.9	68.5	67.8	66.5	65.6	64.6	63.7	62.9
170	70.4	69.6	68.5	67.8	67.0	66.4	65.4	64.7	64.1	63.5	62.9	62.2	61.7
200	68.1	67.1	66.3	65.3	64.7	63.7	63.1	62.2	61.6	60.7	60.1	59.6	59.0
230	66.5	65.4	64.3	63.2	62.4	61.5	60.7	59.8	59.3	58.4	57.9	57.1	56.6
260	65.0	63.7	62.8	61.8	60.8	59.9	58.9	58.0	57.2	56.3	55.8	55.1	54.4
290	62.6	62.0	61.1	60.2	59.1	58.3	57.5	56.7	55.8	55.0	54.2	53.5	52.7
320	60.7	59.8	58.9	58.1	57.3	56.5	55.8	55.0	54.1	53.4	52.8	52.1	51.2
350	58.9	58.0	57.0	56.2	55.4	54.7	53.9	53.2	52.6	51.9	51.1	50.5	49.7
380	57.1	56.1	55.3	54.3	53.6	52.7	52.0	51.4	50.7	50.1	49.5	48.9	48.2
410	55.5	54.5	53.6	52.6	51.8	51.1	50.3	49.7	48.9	48.3	47.7	47.2	46.6
440	54.0	53.0	52.1	51.0	50.2	49.4	48.6	48.0	47.3	46.6	46.1	45.4	44.9
470	52.7	51.6	50.5	49.7	48.7	48.0	47.2	46.5	45.8	45.1	44.5	43.9	43.3
500	51.3	50.3	49.2	48.3	47.4	46.5	45.8	45.1	44.3	43.7	43.0	42.4	41.9

Coal strength, psi 900 **Mining width, ft** 11.50 **No. web pillars** 19

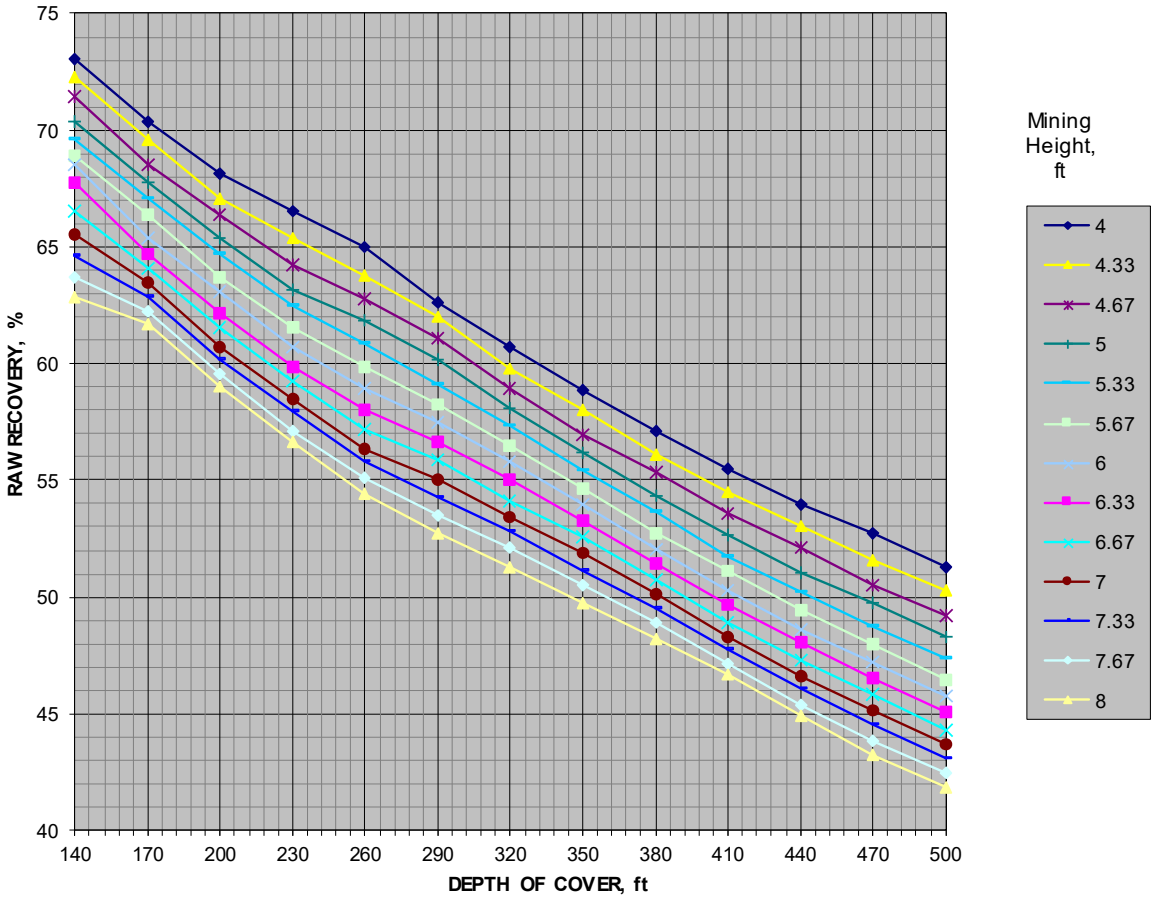

Figure 6c. Raw Recovery—Collom E2 Seam